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1 System and method of color interpolation

Inventor: WANG H TAICHI (US)

Applicant: BIOMORPHIC VLSI INC (US)

EC:

IPC: H04N3/14 ; H04N5/335 ; (+2)

Publication info: **US6781626** - 2004-08-24

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Result page: [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [next](#)Relevance scale **1 The computation of optical flow** 

S. S. Beauchemin, J. L. Barron

September 1995 **ACM Computing Surveys (CSUR)**, Volume 27 Issue 3Full text available:  [pdf\(3.06 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Two-dimensional image motion is the projection of the three-dimensional motion of objects, relative to a visual sensor, onto its image plane. Sequences of time-ordered images allow the estimation of projected two-dimensional image motion as either instantaneous image velocities or discrete image displacements. These are usually called the optical flow field or the image velocity field. Provided that optical flow is a reliable approximation to two-dimensional ...

2 Cloth and filtering: The trilateral filter for high contrast images and meshes 

Prasun Choudhury, Jack Tumblin

June 2003 **Proceedings of the 14th Eurographics workshop on Rendering**Full text available:  [pdf\(2.10 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present a new, single-pass nonlinear filter for edge-preserving smoothing and visual detail removal for N dimensional signals in computer graphics, image processing and computer vision applications. Built from two modified forms of Tomasi and Manduchi's bilateral filter, the new "trilateral" filter smoothes signals towards a sharply-bounded, piecewise-linear approximation. Unlike bilateral filters or anisotropic diffusion methods that smooth towards piecewise constant solutions, the tr ...

3 Capturing the real world: A local model of eye adaptation for high dynamic range images 

Patrick Ledda, Luis Paulo Santos, Alan Chalmers

November 2004 **Proceedings of the 3rd international conference on Computer graphics, virtual reality, visualisation and interaction in Africa**Full text available:  [pdf\(700.84 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In the real world, the human eye is confronted with a wide range of luminances from bright sunshine to low night light. Our eyes cope with this vast range of intensities by adaptation; changing their sensitivity to be responsive at different illumination levels. This adaptation is highly localized, allowing us to see both dark and bright regions of a high dynamic range environment. In this paper we present a new model of eye adaptation based on physiological data. The model, which can be easi ...

Keywords: eye adaptation, high dynamic range, human visual system, tone mapping**4 Image-based transfer function design for data exploration in volume visualization** 

Shiaofen Fang, Tom Biddlecome, Mihran Tuceryan

Keywords: 3D image processing, data exploration, transfer function, volume rendering, volume visualization

5 **Three-dimensional medical imaging: algorithms and computer systems** 

M. R. Stytz, G. Frieder, O. Frieder

December 1991 **ACM Computing Surveys (CSUR)**, Volume 23 Issue 4

Full text available:  [pdf\(7.38 MB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#), [review](#)

Keywords: Computer graphics, medical imaging, surface rendering, three-dimensional imaging, volume rendering

6 **Image retrieval: Content representation and similarity matching for texture-based image retrieval** 

Noureddine Abdabeni

November 2003 **Proceedings of the 5th ACM SIGMM international workshop on Multimedia information retrieval**

Full text available:  [pdf\(409.30 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper addresses the fundamental issues of visual content representation and similarity matching in content-based image retrieval and image databases in general. Simply stated, defining an image retrieval system is equivalent to find answers to two fundamental questions: 1. Representation model or which features are used to represent the content of images; 2. Once the set of features representing the content of images is determined, the question of how to combine the individual or partial si ...

Keywords: autoregressive model, content-based image retrieval, perceptual evaluation, perceptual model

7 **Colour, rendering and tone-mapping: A tone mapping algorithm for high contrast images** 

Michael Ashikhmin

July 2002 **Proceedings of the 13th Eurographics workshop on Rendering**

Full text available:  [pdf\(3.05 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A new method is presented that takes as an input a high dynamic range image and maps it into a limited range of luminance values reproducible by a display device. There is significant evidence that a similar operation is performed by early stages of human visual system (HVS). Our approach follows functionality of HVS without attempting to construct its sophisticated model. The operation is performed in three steps. First, we estimate local adaptation luminance at each point in the image. Then, a ...

8 **Industry/government track papers: Effective localized regression for damage detection in large complex mechanical structures** 

Aleksandar Lazarevic, Ramdev Kanapady, Chandrika Kamath

August 2004 **Proceedings of the 2004 ACM SIGKDD international conference on Knowledge discovery and data mining**

Full text available:  [pdf\(597.35 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we propose a novel data mining technique for the efficient damage detection within the large-scale complex mechanical structures. Every mechanical structure is defined

by the set of finite elements that are called structure elements. Large-scale complex structures may have extremely large number of structure elements, and predicting the failure in every single element using the original set of natural frequencies as features is exceptionally time-consuming task. Traditional data m ...

Keywords: clustering, damage detection, localized regression, mechanical structures, structure elements

9 [Image Models](#)



Narendra Ahuja, B. J. Schachter

December 1981 **ACM Computing Surveys (CSUR)**, Volume 13 Issue 4

Full text available:  [pdf\(2.99 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

10 [A survey of methods for recovering quadrics in triangle meshes](#)



Sylvain Petitjean

June 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 2

Full text available:  [pdf\(3.91 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In a variety of practical situations such as reverse engineering of boundary representation from depth maps of scanned objects, range data analysis, model-based recognition and algebraic surface design, there is a need to recover the shape of visible surfaces of a dense 3D point set. In particular, it is desirable to identify and fit simple surfaces of known type wherever these are in reasonable agreement with the data. We are interested in the class of quadric surfaces, that is, algebraic surfa ...

Keywords: Data fitting, geometry enhancement, local geometry estimation, mesh fairing, shape recovery

11 [Mathematical Models for Automatic Line Detection](#)



Arnold K. Griffith

January 1973 **Journal of the ACM (JACM)**, Volume 20 Issue 1

Full text available:  [pdf\(1.24 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A particular decision-theoretic approach to the problem of detecting straight edges and lines in pictures is discussed. A model is proposed of the appearance of scenes consisting of prismatic solids, taking into account blurring, noise, and smooth variations in intensity over faces. A suboptimal statistical decision procedure is developed for the identification of a line within a narrow band in the field of view, given an array of intensity values from within the band. The performance of th ...

12 [Multi-resolution multi-field ray tracing: a mathematical overview](#)



C. Gasparakis

October 1999 **Proceedings of the conference on Visualization '99: celebrating ten years**

Full text available:  [pdf\(211.49 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A rigorous mathematical review of ray tracing is presented. The concept of a generic voxel decoder acting on flexible voxel formats is introduced. The necessity of interpolating opacity weighted colors is proved, using a new definition of the blending process in terms of functional integrals. The continuum limit of the discrete opacity accumulation formula is presented, and its convexity properties are investigated. The issues pertaining to interpolation/classification order are discussed. ...

13 [A hand biomechanics workstation](#)



David E. Thompson, William L. Buford, Loyd M. Myers, David J. Giurintano, John A. Brewer
June 1988 **ACM SIGGRAPH Computer Graphics , Proceedings of the 15th annual**

Interactive graphics for hand surgery was used to apply mathematical modeling and describe the kinematics of the hand and its resultant effect on hand function. Dynamic high resolution displays and three-dimensional images were tailored for use with a specific patients' hand and a new and powerful design and analysis tool produced. Methods were developed to portray kinematic information such as muscle excursion and effective moment arm and extended to yield dynamic information such as torque and ...

Keywords: CT and MR imaging, computer aided design, computer graphics, hand surgery, hand therapy, orthopedic surgery

14 Visual perception and communication: Image fusion for context enhancement and video surrealism 

Ramesh Raskar, Adrian Ilie, Jingyi Yu

June 2004 **Proceedings of the 3rd international symposium on Non-photorealistic animation and rendering**

Full text available:  pdf(1.04 MB) Additional Information: [full citation](#), [abstract](#), [references](#)

We present a class of image fusion techniques to automatically combine images of a scene captured under different illumination. Beyond providing digital tools for artists for creating surrealist images and videos, the methods can also be used for practical applications. For example, the non-realistic appearance can be used to enhance the context of nighttime traffic videos so that they are easier to understand. The context is automatically captured from a fixed camera and inserted from a day-tim ...

Keywords: gradient domain approach, image fusion, surrealism

15 Cube-4—a scalable architecture for real-time volume rendering 

Hanspeter Pfister, Arie Kaufman

October 1996 **Proceedings of the 1996 symposium on Volume visualization**

Full text available:  pdf(2.68 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

16 Two methods for display of high contrast images 

Jack Tumblin, Jessica K. Hodgins, Brian K. Guenter

January 1999 **ACM Transactions on Graphics (TOG)**, Volume 18 Issue 1

Full text available:  pdf(10.28 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

High contrast images are common in night scenes and other scenes that include dark shadows and bright light sources. These scenes are difficult to display because their contrasts greatly exceed the range of most display devices for images. As a result, the image contrasts are compressed or truncated, obscuring subtle textures and details. Humans view and understand high contrast scenes easily, "adapting" their visual response to avoid compression or truncation with no apparent ...

Keywords: adaptation, tone reproduction, visual appearance

17 Flash & color: Flash photography enhancement via intrinsic relighting 

Elmar Eisemann, Frédo Durand

August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available:  pdf(406.48 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

We enhance photographs shot in dark environments by combining a picture taken with the available light and one taken with the flash. We preserve the ambience of the original lighting and insert the sharpness from the flash image. We use the bilateral filter to

decompose the images into detail and large scale. We reconstruct the image using the large scale of the available lighting and the detail of the flash. We detect and correct flash shadows. This combines the advantages of available illumina ...

Keywords: Computational photography, bilateral filtering, flash photography, image fusion, relighting, tone mapping

18 Second-generation image coding: an overview



M. M. Reid, R. J. Millar, N. D. Black

March 1997 **ACM Computing Surveys (CSUR)**, Volume 29 Issue 1

Full text available: [pdf\(12.23 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#), [review](#)

This article gives an overview of a diverse selection of currently used second-generation image coding techniques. These techniques have been grouped into similar categories in order to allow a direct comparison among the varying methods. An attempt has been made, where possible, to expand upon and clarify the details given by the original authors. The relative merits and shortcomings of each of the techniques are compared and contrasted.

Keywords: MRI, compression, image coding

19 Three-dimensional object recognition



Paul J. Besl, Ramesh C. Jain

March 1985 **ACM Computing Surveys (CSUR)**, Volume 17 Issue 1

Full text available: [pdf\(7.76 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

A general-purpose computer vision system must be capable of recognizing three-dimensional (3-D) objects. This paper proposes a precise definition of the 3-D object recognition problem, discusses basic concepts associated with this problem, and reviews the relevant literature. Because range images (or depth maps) are often used as sensor input instead of intensity images, techniques for obtaining, processing, and characterizing range data are also surveyed.

20 Model-based object recognition in dense-range images—a review



Farshid Arman, J. K. Aggarwal

March 1993 **ACM Computing Surveys (CSUR)**, Volume 25 Issue 1

Full text available: [pdf\(3.42 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

The goal in computer vision systems is to analyze data collected from the environment and derive an interpretation to complete a specified task. Vision system tasks may be divided into data acquisition, low-level processing, representation, model construction, and matching subtasks. This paper presents a comprehensive survey of model-based vision systems using dense-range images. A comprehensive survey of the recent publications in each subtask pertaining to dense-range image object recogni ...

Keywords: 3D object recognition, 3D representations, CAD-based vision, dense-range images, image understanding

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1 [Image Models](#)

Narendra Ahuja, B. J. Schachter

December 1981 **ACM Computing Surveys (CSUR)**, Volume 13 Issue 4Full text available: [pdf\(2.99 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)**2** [The computation of optical flow](#)

S. S. Beauchemin, J. L. Barron

September 1995 **ACM Computing Surveys (CSUR)**, Volume 27 Issue 3Full text available: [pdf\(3.06 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

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3 [Sparse matrix solvers on the GPU: conjugate gradients and multigrid](#)

Jeff Bolz, Ian Farmer, Eitan Grinspun, Peter Schröder

July 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3Full text available: [pdf\(753.59 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Many computer graphics applications require high-intensity numerical simulation. We show that such computations can be performed efficiently on the GPU, which we regard as a full function *streaming* processor with high floating-point performance. We implemented two basic, broadly useful, computational kernels: a *sparse matrix conjugate gradient solver* and a regular-grid *multigrid solver*. Real time applications ranging from mesh smoothing and parameterization to fluid solvers ...

Keywords: GPU computing, Navier-Stokes, conjugate gradient, fluid simulation, mesh smoothing, multigrid, numerical simulation

4 [Three-dimensional medical imaging: algorithms and computer systems](#)

M. R. Stytz, G. Frieder, O. Frieder

December 1991 **ACM Computing Surveys (CSUR)**, Volume 23 Issue 4Full text available: [pdf\(7.38 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#), [review](#)

Keywords: Computer graphics, medical imaging, surface rendering, three-dimensional imaging, volume rendering

5 A survey of methods for recovering quadrics in triangle meshes

Sylvain Petitjean

June 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 2

Full text available:  [pdf\(3.91 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

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C. Gasparakis

October 1999 **Proceedings of the conference on Visualization '99: celebrating ten years**

Full text available:  [pdf\(211.49 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

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Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

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Keywords: 3D object recognition, 3D representations, CAD-based vision, dense-range images, image understanding

9 Tracking: Multi-resolution background modeling of dynamic scenes using weighted match filters



Quanren Xiong, Christopher Jaynes

October 2004 **Proceedings of the ACM 2nd international workshop on Video surveillance & sensor networks**

Full text available: [pdf\(877.82 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Accurate background modeling is fundamentally important to motion-based segmentation, object tracking, and video surveillance. Models must discriminate between coherent foreground motion and periodic, random, or small pixel variations typically found in complex outdoor scenes. We introduce an adaptive match filter framework that is capable of modeling the locally changing spatial image structure. The correlation values of these filters are combined to robustly discriminate foreground regions ...

Keywords: background modeling, dynamic scenes, minimum average correlation energy filter

10 Second-generation image coding: an overview



M. M. Reid, R. J. Millar, N. D. Black

March 1997 **ACM Computing Surveys (CSUR)**, Volume 29 Issue 1

Full text available: [pdf\(12.23 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#), [review](#)

This article gives an overview of a diverse selection of currently used second-generation image coding techniques. These techniques have been grouped into similar categories in order to allow a direct comparison among the varying methods. An attempt has been made, where possible, to expand upon and clarify the details given by the original authors. The relative merits and shortcomings of each of the techniques are compared and contrasted.

Keywords: MRI, compression, image coding

11 A survey of image registration techniques



Lisa Gottesfeld Brown

December 1992 **ACM Computing Surveys (CSUR)**, Volume 24 Issue 4

Full text available: [pdf\(5.20 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Registration is a fundamental task in image processing used to match two or more pictures taken, for example, at different times, from different sensors, or from different viewpoints. Virtually all large systems which evaluate images require the registration of images, or a closely related operation, as an intermediate step. Specific examples of systems where image registration is a significant component include matching a target with a real-time image of a scene for target recognition, mon ...

Keywords: image registration, image warping, rectification, template matching

12 Special issue on independent components analysis: A generative model for separating illumination and reflectance from images



Inna Stainvas, David Lowe

December 2003 **The Journal of Machine Learning Research**, Volume 4

Full text available: [pdf\(764.42 KB\)](#) Additional Information: [full citation](#), [abstract](#), [index terms](#)

It is well known that even slight changes in nonuniform illumination lead to a large image variability and are crucial for many visual tasks. This paper presents a new ICA related probabilistic model where the number of sources exceeds the number of sensors to perform an image segmentation and illumination removal, simultaneously. We model illumination and reflectance in log space by a generalized autoregressive process and Hidden Gaussian Markov random field, respectively. The model ability to d ...

13 Image snapping

Michael Gleicher

September 1995 **Proceedings of the 22nd annual conference on Computer graphics and interactive techniques**

Full text available:  [pdf\(309.63 KB\)](#)

 [ps\(2.81 MB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



14 Efficiently using graphics hardware in volume rendering applications

Rüdiger Westermann, Thomas Ertl

July 1998 **Proceedings of the 25th annual conference on Computer graphics and interactive techniques**

Full text available:  [pdf\(13.14 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



15 Tracking/detection section: Multi-level background initialization using Hidden Markov Models

Marco Cristani, Manuele Bicego, Vittorio Murino

November 2003 **First ACM SIGMM international workshop on Video surveillance**

Full text available:  [pdf\(1.17 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Most of the automated video-surveillance applications are based on the process of background modelling, aimed at discriminating motion patterns of interest at pixel, region or frame level in a nearly static scene. The issues characterizing an ordinary background modelling process are typically three: the background model representation, the initialization, and the adaptation. This paper proposes a novel initialization algorithm, able to bootstrap an integrated pixel and region-based background m ...

Keywords: Hidden Markov Model, pixel-region background initialization, video surveillance



16 HDR and tone mapping: Interactive time-dependent tone mapping using programmable graphics hardware

Nolan Goodnight, Rui Wang, Cliff Woolley, Greg Humphreys

June 2003 **Proceedings of the 14th Eurographics workshop on Rendering**

Full text available:  [pdf\(7.56 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Modern graphics architectures have replaced stages of the graphics pipeline with fully programmable modules. Therefore, it is now possible to perform fairly general computation on each vertex or fragment in a scene. In addition, the nature of the graphics pipeline makes substantial computational power available if the programs have a suitable structure. In this paper, we show that it is possible to cleanly map a state-of-the-art tone mapping algorithm to the pixel processor. This allows an inter ...



17 Modeling and rendering architecture from photographs: a hybrid geometry- and image-based approach

Paul E. Debevec, Camillo J. Taylor, Jitendra Malik

August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available:  [pdf\(251.64 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



18 Image retrieval: Content representation and similarity matching for texture-based image retrieval

Noureddine Abdabeni

November 2003 **Proceedings of the 5th ACM SIGMM international workshop on Multimedia information retrieval**



This paper addresses the fundamental issues of visual content representation and similarity matching in content-based image retrieval and image databases in general. Simply stated, defining an image retrieval system is equivalent to find answers to two fundamental questions: 1. Representation model or which features are used to represent the content of images; 2. Once the set of features representing the content of images is determined, the question of how to combine the individual or partial si ...

Keywords: autoregressive model, content-based image retrieval, perceptual evaluation, perceptual model

19 [Generative modeling for continuous non-linearly embedded visual inference](#) 

Cristian Sminchisescu, Allan Jepson

July 2004 **Twenty-first international conference on Machine learning**

Many difficult visual perception problems, like 3D human motion estimation, can be formulated in terms of inference using complex generative models, defined over high-dimensional state spaces. Despite progress, optimizing such models is difficult because prior knowledge cannot be flexibly integrated in order to reshape an initially designed representation space. Nonlinearities, inherent sparsity of high-dimensional training sets, and lack of global continuity makes dimensionality reduction chall ...

20 [Geometric surface processing via normal maps](#) 

Tolga Tasdizen, Ross Whitaker, Paul Burchard, Stanley Osher

October 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 4

We propose that the generalization of signal and image processing to surfaces entails filtering the normals of the surface, rather than filtering the positions of points on a mesh. Using a variational strategy, penalty functions on the surface geometry can be formulated as penalty functions on the surface normals, which are computed using geometry-based shape metrics and minimized using fourth-order gradient descent partial differential equations (PDEs). In this paper, we introduce a two-step ap ...

Keywords: Surface fairing, anisotropic diffusion, geometric surface processing, high-boost filtering, level sets

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